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Content Engineering Agent:
A TBL-Based E-Course Development Tool with TQM

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INTRODUCTION

With the growth in Internet and the advance in Internet technology, "e-learning" provides an alternative learning model for teachers and students. This emerging mode of learning is very different from traditional classroom education and distance learning. And e-learning has become the focus of research by education professionals (Leadbeater, 1999). A lot of e-learning platforms, such as BlackBoard (2002) and WebCT (2002), have been developed by different researchers and vendors (see also Gertner & VanLehn, 2000; Zhou et al., 1996). However, these existing platforms usually focus on the technology aspect without paying much attention to other issues such as pedagogical concerns and quality control. These issues are, in fact, critical for the success of e-

learning (Harasim, 1999; Furnell et al., 2001). The following summarizes some of the drawbacks of the existing platforms:

- **Big gap between technology and teaching pedagogy:** Existing platforms seldom emphasize the pedagogical aspect. Consequently, the lack of pedagogy makes these platforms more like just repositories of course materials. They allow students to retrieve learning materials from the platform. As a result, they are still far away from traditional face-to-face teaching.
- **Poor personalization:** Truly personalization of individual student's learning path based on individual's study pace and knowledge background is not implemented in existing platforms. Specific advice for

individual students regarding personal learning problems are missing. In most of the existing platforms, either they do not provide any advice for students or the advice is not personalized. In this case, students may not benefit from this kind of general advice.

- **User-friendliness (usability):** Teachers are required to take a long time to learn to use the platform and usually a team of technical support staff is necessary for ensuring smooth operations performed by the teachers. And communicating the instructional requirements between teachers and the technical team is usually a major bottleneck of e-course development provided that the communication is possible at all.

- **Quality control:** Existing platforms usually do not have quality control in e-course curriculum development and have poor feedback mechanism to evaluate the effectiveness of the course materials. Without this feedback mechanism, it is not easy to implement a good and standard procedure to improve the quality of the course materials.

In order to address these issues, the School of Professional and Continuing Education (SPACE) of the University of Hong Kong set up a team, called the SPACE Online Universal Learning (SOUL) Project team, in 1998. The aim of the project is to provide online support for educational purposes, to develop SPACE online support courses in both Hong Kong and the Mainland China, and to carry out researches related to online learning. The SOUL platform is the major product of the project group.

The SOUL platform is based on the system architecture, called the *PowerEdBuilder*, which will be described in the next section. Different components of PowerEdBuilder will tackle different issues regarding online learning and will work together as a single platform to provide a comfortable and user-friendly environment to teachers, students and administrators. In particular, the *Content Engineering Agent* together with the *Smart Tutor* component of the PowerEdBuilder are designed to provide pedagogical support for teachers to create e-course as well as tailor-made personalization for students to learn the material. In this paper, we will focus on the Content Engineering Agent, which is based on the task-based learning (TBL) (Fenstermacher, 1998; Raggatt et al., 1996; Willis, 2000) curriculum development framework and is embedded with the concept of total quality management (TQM) for the quality control of the developed course material. In fact, TQM applied in education is not a new topic and it is generally believed that TQM is one of the approaches to guarantee the quality of courses (for example, see Chizmar 1994; Sherr & Lozier). For the detailed descriptions of different components of the PowerEdBuilder, one can refer to the publications of the SOUL project team (SOUL, 2002).

The rest of the paper is organized as follows. First an overview on the SOUL platform and the PowerEd-Builder system architecture is given. The details of the content engineering agent, with focus on the task-based learning framework, will follow. The next section will show the preliminary design on how TQM is embedded in the content engineering agent and summarize the evaluation result for the content engineering agent. The conclusion and discussion will be given later.

As a remark, SPACE is one of the leading adult education providers in Hong Kong providing life-long learning for the public. The number of students registered with SPACE programs is more than 60,000 and the number is expected to grow at a tremendous rate. The SOUL platform has already been put in production while improvement and enhancement are being made continuously. Currently, more than 17,000 students and teachers are using the platform. We are collecting feedback from the users in different aspects, which will be used to further improve the platform. We hope that our experience can help the community to

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